Rec'd 2/27/89

# Environmental Resources Management, inc.

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24 February 1989

Ms. Janet Feldstein
U.S. Environmental Protection Agency
Region II
Emergency and Remedial Response Division
Room 737
26 Federal Plaza
New York, New York 10278

File No: 802-01-00-01

Dear Janet:

Enclosed for your review is the Interim Status Report on Phase II activities of the Feasibility Study/First Operable Unit (FS/FOU) for the Scientific Chemical Processing (SCP) site in Carlstadt, New Jersey. Four additional copies are included for your use.

This Interim Status Report summarizes the current Phase II of the FS/FOU, providing the highlights of Phase II activities completed to-date including a discussion of source control alternatives and preliminary screening of these alternatives. The information presented in this Interim Status Report for Phase II is preliminary and subject to change over the course of completion of the FS/FOU.

If you have any questions/comments, please contact Mr. Gil Weil at (201) 563-5905, or me at (215) 524-3521. Thank you.

Sincerely,

Marian E. Donovan Carlin

Marian E. Donovan Carlin
Project Manager

MEDC/jkp

Enclosures

cc: Pam Lange (3 enclosed)
Harry Yeh (2 enclosed)
Gil Weil (enclosed)
Ron Fender (enclosed)
Bill Warren
Susan Hoffman (enclosed)
Diane Leber (enclosed)

**INTERIM STATUS REPORT OF PHASE II FEASIBILITY STUDY/FIRST OPERABLE UNIT**

**SCIENTIFIC CHEMICAL PROCESSING SITE CARLSTADT, NEW JERSEY**

24 February 1989

M. E. D. Carlin for R. G. Fender
Ronald G. Fender
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Prepared For:

SCP/Carlstadt PRP Committee

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The ERM Group

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The ERM Group

## SECTION 1

## SCOPE OF INTERIM STATUS REPORT

### 1.1 Purpose and Scope of Interim Status Report

This Interim Status Report summarizes the current Phase II of the Feasibility Study (FS) for the First Operable Unit for the Scientific Chemical Processing (SCP) site in Carlstadt, New Jersey. This Interim Status Report provides the highlights of the Phase II activities completed to-date including a discussion of source control alternatives and preliminary screening. Certain technologies identified previously in Phase I activities may not be included here in Phase II, because they have been subsequently reevaluated. The Final Feasibility Study will address the complete FS process. The information presented in this Interim Status Report for Phase II is preliminary and subject to change.

## TABLE 1

## PHASE II SCREENING ACTIVITIES, COMPLETED 2/24/89

| | EFFECTIVENESS CRITERIA | | | IMPLEMENTABILITY CRITERIA | | COST CRITERIA |
|---|---|---|---|---|---|---|
| Source Control Alternatives | Short-Term Protectiveness | Long-Term Protectiveness | Reductions in Contaminant Toxicity, Mobility, Volume | Technical Feasibility | Administrative Feasibility | |
| Ground Water Alternatives | Complete | Complete* | Complete | Complete | Complete | Currently under evaluation** |
| Soil/Sludge Alternatives | Complete* | Complete* | Complete | Complete | Complete | Currently under evaluation** |
| Tank Sludge Alternatives | Complete* | Complete* | Complete | Complete | Complete | Currently under evaluation** |

* Pending treatability study results

** Includes Order of Magnitude Cost Estimate Based on Capital and O&M Costs

**SECTION 2**
**PHASE II INITIAL SCREENING OF**
**REMEDIAL ACTION ALTERNATIVES**

In Phase II, the potential remedial action alternatives for ground water soil/sludge, and tank sludge are described and screened based on effectiveness, implementability, and cost considerations. (In this report, the term ground water is used to represent the shallow ground water in the water table aquifer.) The purpose of this screening step is to identify the most suitable alternatives which will undergo a more detailed analysis in Phase III. Table 1 summarizes screening activities conducted to-date for Phase II.

## 2.1 Description of Alternatives

In assembling alternatives, general response actions and the technology process options selected to represent the various technology types are combined to form alternatives for each medium proposed for remediation. A list of alternatives is provided below. A description of each medium-specific alternative follows, for use in understanding the subsequent alternative screening process and to document the logic behind the assembly of each.

### 2.1.1 Description of Shallow Ground Water Alternatives

The shallow ground water alternatives developed include the following:

- GW-1: No Action
- GW-2: Limited Action
- GW-3: Chemical Oxidation, Biological Treatment
- GW-4: UV/Peroxidation
- GW-5: GAC, Sequencing Batch Reactors
- GW-6: Steam Stripping
- GW-7: Critical Fluid Extraction
- GW-8: Powdered Activated Carbon Treatment Biological System

**Alternative GW-1, No Action**

The No Action alternative for ground water would not require any remedial activities, but would provide for long-term monitoring of site ground water. Semi-annual sampling/analysis, utilizing the seven existing wells on site, would monitor contaminant migration and assess the effectiveness of the No Action alternative. This alternative is required to be considered by the National Contingency Plan (NCP) to provide a baseline to which all other alternatives may be compared.

**Alternative GW-2, Limited Action**

The Limited Action alternative for ground water would involve site access limitations and deed restrictions in perpetuity on ground water at the site and long-term shallow ground water monitoring as in Alternative GW-1 above.

**Alternative GW-3, Chemical Oxidation, Biological Treatment**

A ground water collection system such as multiple extraction wells would be installed to withdraw ground water for on-site treatment. The on-site ground water treatment system would consist of chemical oxidation with Fenton's Reagent ($H_2O_2$ and Iron) to reduce the refractory organic loading, followed by biological treatment in sequencing batch reactors. Granular activated carbon and/or chemical precipitation is proposed, if needed, to remove any trace organics or heavy metals prior to on-site or off-site discharge. Sludges generated would be dewatered on site utilizing a filter press, prior to disposal off site in a permitted hazardous waste landfill or incinerator. Spent carbon would be replaced/reactivated by the supplier. Long-term ground water monitoring as in GW-1 would be included to assess treatment efficiency.

**Alternative GW-4, UV/Peroxidation**

This remedial alternative uses the same ground water collection system as GW-3. The ground water would be routed through a treatment system train consisting of chemical precipitation to remove particulate interference with UV photolysis and trace heavy metals and ultraviolet photolysis enhanced by hydrogen peroxide (UV/Peroxidation). Granular activated carbon would follow, if needed to adsorb residual unoxidized compounds prior to on-site or off-site discharge. Sludges generated would be dewatered on site utilizing a filter press, prior to disposal off site in a permitted hazardous waste landfill. Spent carbon would be replaced/reactivated by the supplier. Long-term ground water monitoring, as in GW-1, would be included to assess treatment efficiency.

**Alternative GW-5, GAC/Sequencing Batch Reactors**

This remedial alternative uses the same ground water collection system as GW-3. The ground water would be routed through a treatment system train consisting of chemical precipitation to remove heavy metals and interference with GAC adsorption, granular activated carbon to adsorb refractory organics, and sequencing batch reactors to biologically degrade polar and less adsorbable compounds, for subsequent on-site or off-site discharge. Prior to disposal off site in a permitted hazardous waste landfill or incinerator, sludges generated would be dewatered on site utilizing a filter press. Spent carbon would be replaced/reactivated by the supplier, but on a slower schedule than that of previous alternatives so as to allow GAC beds to remain saturated and act as a "buffer" for biological treatment and not for the primary treatment technology. Long-term ground water monitoring as in GW-1 would be included to assess treatment efficiency.

**Alternative GW-6, Steam Stripping**

The steam stripping alternative would incorporate a ground water collection system similar to GW-3. The ground water would be routed through a treatment system train consisting of chemical precipitation (to remove heavy metals and potentially fouling particulates) and steam stripping, followed by granular activated carbon or UV/Peroxidation (if needed to remove any trace organics) prior to on-site or off-site discharge. Spent carbon from the GAC system would be replaced/reactivated by the supplier. Prior to disposal off site in a permitted hazardous waste landfill, sludges generated would be dewatered on site utilizing a filter press. Long-term ground water monitoring as in GW-1 would be included to evaluate treatment efficiency.

**Alternative GW-7, Critical Fluid Extraction**

This remedial alternative would use the same ground water collection system as GW-3; however, the ground water would be passed through a treatment system train consisting of chemical precipitation (to remove heavy metals and/or potentially GAC- or photolysis-fouling particulates should polishing be necessary) and critical fluid extraction. This train will be followed, if needed, by granular activated carbon or UV/Peroxidation (to remove any trace organics) prior to on-site or off-site discharge. Prior to disposal off site in a permitted hazardous waste landfill, sludges generated would be dewatered on site utilizing a filter press. Spent carbon would be replaced/reactivated by the supplier. Long-term ground water monitoring as in GW-1 would be included to assess treatment efficiency.

### Alternative GW-8, Powdered Activated Carbon Treatment (PACT) Biological System

This remedial alternative would use the same ground water collection system as GW-3. The ground water would be routed through a treatment system train consisting of a PACT biological system, UV/Peroxidation polishing (if needed to remove any trace organics) and chemical precipitation (an optional process to remove heavy metals if they have not already been captured in PACT sludge) prior to on-site or off-site discharge. Prior to disposal off site in a permitted hazardous waste landfill or incinerator, sludges generated would be dewatered on site utilizing a filter press. Long-term ground water monitoring as in GW-1 would be included to evaluate treatment efficiency.

## 2.1.2 Description of Soil/Sludge Alternatives

The soil/sludge alternatives developed include the following:

- S/S-1: No Action
- S/S-2: Limited Action
- S/S-3: Containment and Ground Water Collection
- S/S-4: On-Site Incineration
- S/S-5: Off-Site Incineration
- S/S-6: On-Site Stabilization/Solidification
- S/S-7: In Situ Vitrification
- S/S-8: Excavation and Removal for Off-Site Disposal
- S/S-9: In Situ Soil Flushing and In Situ Stabilization/ Solidification
- S/S-10: Contaminant Extraction and Stabilization/ Solidification with On-Site Disposal
- S/S-11: In Situ Vacuuming/Flushing and In Situ Stabilization/ Solidification
- S/S-12: In Situ Vacuuming/Flushing
- S/S-13: In Situ Stabilization
- S/S-14: In Situ Bioreclamation and In Situ Stabilization/ Solidification

### Alternative S/S-1, No Action

The No Action alternative for soils/sludges would not require any remedial activities, but will include ground water monitoring. This alternative is required to be considered by the NCP to provide a baseline to which all other alternatives may be compared.

### Alternative S/S-2, Limited Action

The Limited Action alternative for soils/sludges would involve repairing or replacing portions of the existing fence and/or construction of a security fence, and posting signs along the perimeter of the site to create site access restrictions. Deed restrictions would be imposed on potential land uses for the site.

### Alternative S/S-3, Containment and Ground Water Collection

The containment alternative for the site soils and sludges will reduce the infiltration of rainwater and restrict ground water flow through the water table aquifer.

The reduction of infiltration will be accomplished through the incorporation of a multi-media cap. The cap surface will be sloped and vegetated to minimize run-on and promote/control run-off and enhance evapotranspiration. The restriction of ground water flow would be accomplished with a slurry wall keyed into the underlying clay layer. This alternative would be acceptable if the clay is shown to be continuous. If the clay layer is not continuous, the slurry wall would be extended into deeper strata; a hydraulic barrier gradient would be maintained through ground water pumping.

The ground water inside the slurry wall will be collected with a ground water collection system and processed as discussed previously in the ground water alternatives.

### Alternative S/S-4, On-Site Incineration

Implementation of this alternative would involve the excavation of site soils and sludges, that is all material above the silt/clay unit, for on-site incineration in a mobile rotary-kiln incinerator.

Prior to conventional excavation of material, a dewatering option would be utilized to dewater the soils and sludges. Ground water would be collected and treated via a previously identified ground water alternative.

Approximately 100,000 cubic yards of soils/sludges would be excavated for incineration on site. Materials too large for acceptance in the incinerating unit (e.g., blocks of concrete, drum remnants) would be sorted and crushed/pulverized on site to permit incineration or possibly pretreated to allow for disposal in a permitted hazardous waste landfill. In addition, air pollution controls will be required for the on-site incinerator to control particulate emissions (e.g., metallic) and/or fumes.

Incinerator ash would be disposed of on-site or off-site, in secure RCRA disposal units, with stabilization/solidification of the ash as needed.

### Alternative S/S-5, Off-Site Incineration

Off-site incineration would involve the excavation of soils and sludges (consisting of all material above the silt/clay unit), for rotary-kiln incineration off site. Soils/sludges containing PCBs exceeding regulated limits would be incinerated at a facility permitted to manage PCBs.

Soils and sludges would be excavated as in S/S-4 above, packaged in 55-gallon drums, and transported to a permitted incinerator. Materials too large for acceptance in an incinerating unit would be sorted and crushed/pulverized on site to permit incineration, or possibly pretreated to allow for disposal in a permitted hazardous waste landfill. Clean soil would be utilized as backfill, and subsequently graded to restore original contours.

### Alternative S/S-6, On-Site Stabilization/Solidification

Implementation of this alternative would involve the excavation of site soils and sludges, that is all material above the silt/clay unit, for on-site stabilization/solidification. The resultant solidified material would be disposed of on site.

Depending on treatability results, the soils and sludges considered for stabilization/solidification may require dewatering prior to excavation as in S/S-4 above. Optimal design mixes of cementitious, pozzolanic, and/or proprietary additives with excavated soils/sludges and pulverized debris, will be based on treatability study trials; mixing will occur in a continuous pug mill. Ground water would be collected and treated via a previously identified ground water alternative.

### Alternative S/S-7, In Situ Vitrification

In situ vitrification of the soils would utilize electric current to vitrify material above the silt/clay unit. Prior to vitrification, the saturated portions of the site soil/sludge would require dewatering as in S/S-4. Water in the soil/sludge significantly increases the cost of processing by virtue of its heat of vaporization. Ground water collected would be treated via an alternative identified previously for ground water. In addition, a layer of clean fill would be spread over the surface prior to vitrification to suppress potential volatile emissions.

During the process, metallic and other inorganic materials would be dissolved into or are encapsulated into the vitrified mass. Organics would be pyrolyzed or go into solution. Gases evolved from the melt that reach the surface and clean fill will be captured in a hood and directed through a granular activated carbon bed for air pollution control. Spent carbon would be disposed of on site as vitrified mass. The need for a cap will depend upon leachability of the vitrified mass.

### Alternative S/S-8, Excavation and Removal for Off-Site Disposal

Off-site disposal of site soils and sludges would involve excavation of material above the silt/clay unit (as in S/S-4 above) and transportation to a permitted hazardous waste landfill for disposal. Clean soil would be utilized as backfill and subsequently graded to restore original contours. Ground water would be collected and treated via a previously identified ground water alternative.

### Alternative S/S-9, In Situ Soil Flushing and In Situ Stabilization/Solidification

Implementation of this alternative would involve the placement of a horizontal drain system upon the silt/clay layer, after dewatering of the fill. Piping would be placed at spacings of 25-50 feet, with proper drainage. A leach field-type application system would spread appropriate soil washing fluids over the entire surface. More than one washing will be required as a result of the variety of compounds present in the soil/sludge matrices. A group of fluids may be necessary for near-complete flushing. Fluids removed would be treated in an on-site ground water treatment system or recycled as appropriate. Upon completion of this process, the soils and sludge would be stabilized/solidified in situ (see S/S-13) to immobilize any residual compounds in the media. A cap would be installed over the surface of the site. Ground water would be collected and treated via a previously identified ground water alternative.

### Alternative S/S-10, Contaminant Extraction and Stabilization/Solidification with On-Site Disposal

This alternative would involve the excavation of all soils/sludges above the silt/clay unit (as in S/S-4 above) for on-site contaminant extraction. The excavated soils/sludges would be mixed with various extraction fluids in batch reactors. Each subsequent fluid utilized would be designated to extract specific contaminants. More than one washing may be required. Upon completion, the treated soils would be stabilized/solidified as in S/S-6 and disposed on-site in a RCRA disposal unit.

### Alternative S/S-11, In Situ Vacuuming/In Situ Soil Flushing and In Situ Stabilization/Solidification

This alternative involves the installation of a system of drains for soil washing, as in S/S-9 above. Prior to the introduction of washing fluids to the system, however, a pumping system would be connected to the drains in order to create a vacuum thereby drawing off the volatile gases from the soils. Additional extraction points may be necessary in order to create a strong enough vacuum to effectively remove the amount of gases required. Following this in situ vacuuming step, flushing and stabilization/solidification of the soils would begin and continue as in S/S-9 above. A cap would be installed over the surface of the site. Ground water would be collected and treated via a previously identified ground water alternative.

### Alternative S/S-12, In Situ Vacuuming/In Situ Soil Flushing

This alternative will proceed as in S/S-11; however, no stabilization/solidification of the treated soils will be completed upon processing.

### Alternative S/S-13, In Situ Stabilization/Solidification

This alternative would involve the injection of large amounts of a stabilization agent (i.e., pozzolanic, cementitious, or proprietary additives) in order to stabilize/solidify the soil and sludges in place. These materials would be injected via a power auger system, in a specified pattern to ensure that all soils and sludges have been amply contacted and mixed with the agents. A multi-media cap would be placed over the site to limit the influx of surface waters. Optimal design mixtures of cementitious, pozzolanic and/or proprietary additives will be based on treatability studies. Dewatering of the site soils and sludges will occur as per previous alternatives, if stabilization/solidification treatability results dictate lower water contents than those present at the site.

### Alternative S/S-14, In Situ Bioreclamation and In Situ Stabilization/Solidification

In this alternative, effluent from the ground water treatment system would be aerated and nutrients and bacteria added prior to reinjection into the subsurface. The bacteria would degrade organic compounds remaining in the soils. Upon significant degradation, the soils and sludges would be stabilized as in S/S-13 above.

### 2.1.3 Description of Tank Sludge Alternatives

The tank sludge alternatives developed include the following:

- T-1: In Situ Vitrification
- T-2: In-Tank Stabilization/Solidification, On-Site Disposal
- T-3: On-Site Incineration
- T-4: Off-Site Incineration
- T-5: Off-Site Disposal

#### Alternative T-1, In Situ Vitrification

Implementation of this alternative for the tank would require the remediation of site soils/sludges by in situ vitrification as well (S/S-7). The tank would be placed in a portion of the site awaiting vitrification, approximately 2 feet below the surface, for incorporation into the vitrified mass upon processing.

#### Alternative T-2, In-Tank Stabilization/Solidification and On-Site Disposal

The sludge in the tank would be stabilized by adding catalyzed resins directly into the tank, and allowed to mix and solidify. The entire volume of the tank would be filled. The tank would then be encapsulated prior to on-site disposal.

#### Alternative T-3, On-Site Incineration

The sludge in the tank would be excavated by bucketing or other suitable techniques for incorporation into the mass of site soil and sludge to be incinerated on site. Implementation of this alternative would require the on-site incineration of soils/sludges (S/S-4).

#### Alternative T-4, Off-Site Incineration

The sludge in the 10,000 gallon-tank would be removed and placed in 55-gallon drums for off-site incineration. The tank remains would be pretreated on site to allow disposal in a permitted hazardous waste landfill.

### Alternative T-5, Off-Site Disposal

Tank sludge would be removed and drummed for disposal off-site in a permitted hazardous waste landfill. The tank remains would also be pretreated to allow disposal off site, as well.

## 2.2 Identification of Regulatory Requirements

USEPA developed the Applicable or Relevant and Appropriate Requirements (ARARs) concept to govern Superfund compliance with other environmental and public health statutes in remedial actions. Two types of ARARs exist: "applicable" and "relevant and appropriate" requirements of federal and state laws. An "applicable" requirement is any standard, criteria, requirement, or limitation promulgated under federal or state law that addresses a specific contaminant, remedial action, or location pertaining to a CERCLA site. A "relevant and appropriate" requirement is any standard or limitation that, while not applicable to the hazardous substance, action, or location at a CERCLA site, does address problems or situations sufficiently similar to those encountered at the CERCLA site that its use is suited (USEPA 1988).

If no ARAR exists for a CERCLA site situation, other federal and state criteria, advisories, guidance, or proposed rules are To Be Considered for developing remedial alternative performance goals. These "To Be Considered" guidance (TBCs) are not legally binding, but may provide useful information or recommended procedures that explain or augment the content of ARARs. If no ARAR addresses a particular situation, or if existing ARARs do not ensure protection of human health and the environment at a particular site, TBCs should be evaluated for use in determining the necessary level of cleanup.

### 2.2.1 Listing of ARARs and TBCs

A listing of the chemical-, location-, and action-specific ARARs and TBCs is presented in Tables 2a, 2b, and 2c, respectively.

The discussion below presents general descriptions of the prominent chemical-specific ARARs and TBCs to be used in remedial alternative evaluations. The focus of these discussions is on distinguishing between alternatives based upon attainment of these requirements.

- **Federal and New Jersey Safe Drinking Water Act MCLs**
  Federal and New Jersey Maximum Contaminant Levels (MCLs) establish safe levels of contaminants in drinking water (i.e., at the tap) which are protective of human health. EPA guidance indicates that MCLs are relevant and appropriate ARARs for ground water which is used or may be used for drinking purposes.

- **New Jersey SCP Specific Ground Water Cleanup Levels**
  New Jersey SCP specific ground water cleanup levels are non-promulgated criteria which were developed by NJDEP for the purpose of ground water remediation. NJDEP provided these cleanup levels based on the compounds listed in Dames & Moore's report "Draft Remedial Investigation," 19 April 1988.

- **New Jersey Soil Cleanup Objectives**
  New Jersey soil cleanup objectives are not promulgated but are called "To Be Considered" (TBC) guidance. NJDEP's Soil Cleanup objectives contain a summary of New Jersey's theoretical approaches to establishing cleanup levels for contaminated soil. The five approaches presented by NJDEP include: 1) background concentrations; 2) analytical detection limits; 3) risk assessment methodology; 4) surrogate or action levels; and 5) chemical class cleanup objectives.

## 2.3 Development of Remedial Action Alternative Screening Criteria

Remedial alternatives assembled for both the ground water and soil/sludge are evaluated against three criteria: effectiveness, implementability, and cost. The purpose of this screening in Phase II is to reduce the number of alternatives that will undergo a more thorough and extensive analysis later in Phase III. The criteria for screening are described below.

### 2.3.1 Effectiveness

A key aspect of the screening evaluation is the effectiveness of each alternative in protecting human health and the environment. Each alternative is evaluated as to the protectiveness that it will provide, and the reductions in toxicity, mobility, or volume it would achieve. Both short-term (the construction and implementation periods) and long-term (the period after the remedial action is complete) components of protectiveness are evaluated. A summary of effectiveness criteria currently under evaluation is included in Table 3.

**TABLE 2a**
**CHEMICAL-SPECIFIC REQUIREMENTS (1)**

- Federal and New Jersey Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs) (40 CFR 141.11 - 16 and N.J.A.C. &:10-5.1)
- New Jersey SCP Specific Ground Water Cleanup Levels (NJDEP 9 July 1988)
- Clean Water Act - Water Quality Criteria (CWA §304)
- New Jersey Ground Water Quality Standards (N.J.A.C. 7:9-6)
- New Jersey Soil Cleanup Objectives
- New Jersey Surface Water Quality Standards (N.J.A.C. 7:9-4)
- New Jersey Criteria for Ground Water Protection and Response (N.J.A.C. 7:14A-6.15)
- NJPDES Values for Toxic Effluent Limitations (N.J.A.C. 7:14A-1, Appendix F)
- New Jersey Ambient Air Quality Standards (N.J.A.C. 7:27-13)
- EPA Drinking Water Health Advisories
- EPA Health Effects Assessments (HEAs) and Toxicological Profiles
- EPA's Ground Water Classification Guidelines and Protection Strategy
- New Jersey Interim Action levels for selected organics in Drinking Water, January 1986
- New Jersey Interim Ground Water Cleanup Guidance (1986)
- Proposed Air Emission Standards for Treatment, Storage and Disposal Facilities (52 FR 3748 February 1987)

(1) USEPA, Memorandum to William L. Warren of Cohen, Shapiro, Polisher, Sheikman & Cohen, 27 June 1988

**TABLE 2b**

**LOCATION-SPECIFIC REQUIREMENTS (1)**

- Executive Orders 11988 and 11990 on Floodplain Management and Wetlands Protection
- Clean Water Act §404
- New Jersey General Standards for Permitting Stream Encroachment (N.J.A.C. 7:-8-3.15)
- Hackensack Meadowlands Development Commission (HMDC) Zoning/Land Use/Environmental Requirements (N.J.A.C. 19:4)
- Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. 1451)
- The Freshwater Wetlands Protection Act of 1987 (NJSA 13:18-1)

(1) USEPA, Memorandum to William L. Warren of Cohen, Shapiro, Polisher, Sheikman & Cohen, 27 June 1988

**TABLE 2c**
**ACTION-SPECIFIC REQUIREMENTS (1)**

- New Jersey Soil Erosion and Sediment Control Requirements (N.J.S.A. 4:24-1)
- Occupational Safety and Health Act (OSHA) Requirements
- Clean Water Act §402 - National Pollutant Discharge Elimination System (NPDES) (40 CFR Parts 122-125)
- SDWA Underground Injection Control Program (40 CFR 144-147)
- New Jersey Pollutant Discharge Elimination System (N.J.S.A. 58.10A-1)
- New Jersey Permit to Divert Surface of Subsurface Waters (N.J.A.C. 7:19)
- New Jersey Well Drilling and Pump Installers Licensing Act (N.J.A.C. 7:8-3.11)
- Clean Air Act National Emission Standards for Hazardous Waste Air Pollutants (NESHAPS) (40 CFR Part 61)
- New Jersey Air Permit Requirements (N.J.A.C. 7:27-8)
- New Jersey Control and Prohibition of Air Pollution by Toxic Substances (N.J.A.C. 7:27-17)
- New Jersey Regulations for volatile Organic Substances (N.J.A.C. 7:27-16)
- New Jersey Regulations on Incinerators (N.J.A.C. 7:27-11)
- New Jersey Hazardous Waste Facility Design and Operating Requirements (N.J.A.C. 7:20-10.4 to 10.8 and 11.6 and 11.7)
- DOT Rules for Transportation of Hazardous Materials (49 CFR Parts 107, 171.1-1.71.500)

(1) USEPA, Memorandum to William L. Warren of Cohen, Shapiro, Polisher, Sheikman & Cohen, 27 June 1988

## TABLE 2c (Continued)

## ACTION-SPECIFIC REQUIREMENTS (1)

- New Jersey Hazardous Waste Hauler Responsibilities (N.J.A.C. 7:26-7)
- RCRA Land Disposal Restrictions (40 CFR Part 26B)
- TSCA Storage and Disposal of PCB Wastes (40 CFR 761.60-761.79)
- TSCA Recordkeeping, Reporting, and Marking of PCB Equipment (40 CFR 761.40-761.79)
- New Jersey Hazardous Waste Facility Closure/Post-Closure Requirements (N.J.A.C. 7:26)
- New Jersey Hazardous Waste Facility Requirements - General (N.J.A.C. 7:26 subchapter 9)

(1) USEPA, Memorandum to William L. Warren of Cohen, Shapiro, Polisher, Sheikman & Cohen, 27 June 1988

TABLE 3
EFFECTIVENESS CRITERIA EVALUATION

| Alternative | | Short-Term Protectiveness | Long-Term Protectiveness | Reductions in Contaminant | | |
|---|---|---|---|---|---|---|
| | | | | Toxicity | Mobility | Volume |
| GW-1: | No Action | - Will not comply with ARARs for ground water<br>- Does not satisfy Remedial Action Objectives for ground water<br>- Does not prevent further ground water degradation<br>- Will not inhibit the migration of ground water contaminants to hydraulically connected media<br>- No existing unacceptable risk, as ground water table aquifer is not cuttently used as a potable water supply | - Will not comply with ARARs for ground water<br>- Does not satisfy Remedial Action Objectives for ground water<br>- Does not prevent further ground water degradation<br>- Will not inhibit the migration of ground water contaminants to hydraulically connected media<br>- Will not prevent exposure of future ground water users to contaminated ground water | - None | - None | - None |
| GW-2: | Limited Action | - Will not comply with ARARs for ground water<br>- Does not satisfy Remedial Action Objectives for ground water<br>- Does not prevent further ground water degradation<br>- Will not inhibit the migration of ground water contaminants to hydraulically connected media<br>- No existing unacceptable risk, as ground water table aquifer is not cuttently used as a potable water supply | - Will not comply with ARARs for ground water<br>- Does not satisfy Remedial Action Objectives for ground water<br>- Does not prevent further ground water degradation<br>- Will not inhibit the migration of ground water contaminants to hydraulically connected media<br>- Uncertain controls pertaining to future use restrictions on water table aquifer | - None | - None | - None |

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| | | | | | | |
|---|---|---|---|---|---|---|
| GW-3: | Chemical Oxidation, Biological Treatment, Optional GAC, Optional Chemical Precipitation | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs *<br>- Satisfies Remedial Action Objectives for ground water * | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |
| GW-4: | Chemical Precipitation, UV/Peroxidation, Optional GAC | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs *<br>- Satisfies Remedial Action Objectives for ground water * | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |

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| GW-5: | Chemical Precipitation, GAC, Sequencing Batch Reactors | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs *<br>- Satisfies Remedial Action Objectives for ground water * | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |
| GW-6: | Chemical Precipitation, Steam Stripping, Optional GAC or UV/Peroxidation | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs *<br>- Satisfies Remedial Action Objectives for ground water * | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |

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| GW-7: | Optional Chemical Precipitation, Critical Fluid Extraction, Optional GAC or UV/Peroxidation | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs •<br>- Satisfies Remedial Action Objectives for ground water • | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |
| GW-8: | PACT, Optional UV/Peroxidation | - Will not comply with site-specific ARARs for ground water during remediation<br>- Will not satisfy Remedial Action objectives for ground water during remediation<br>- Continuous extraction of ground water from water table aquifer should reduce contaminant migration to hydraulically connected media<br>- No acceptable short-term risks to on-site workers, as all treatment units are enclosed and suspected air emissions will comply with suitable ARARs | - Compliance with specific ground water ARARs •<br>- Satisfies Remedial Action Objectives for ground water • | - System reduces toxicity over course of treatment (remediation) | - System removes contaminants from water table aquifer for treatment | - Volume of contaminants in media will be reduced by treatment |

• Depending upon treatability study results

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TABLE 3 (cont.)

| Alternative | | Short-Term Protectiveness | Long-Term Protectiveness | Reductions in Contaminant<br>Toxicity | <br>Mobility | <br>Volume |
|---|---|---|---|---|---|---|
| S/S1: | No action | - Will not achieve TBCs for soils<br>- Does not achieve Remedial Action Objectives for soils<br>- Will not inhibit the migration of soil contaminats to other media | - Will not achieve TBCs for soils<br>- Does not achieve Remedial Action Objectives for soils<br>- Will not inhibit the migration of soil contaminats to other media | - None | - None | - None |
| S/S-2: | Limited action | - Will not achieve TBCs for soils<br>- Does not achieve Remedial Action Objectives for soils<br>- Will not inhibit the migration of soil contaminats to other media | - Construction of new fence will inhibit receptors from potential exposure to soils via direct contact<br>- Will not achieve TBCs for soils<br>- Will not inhibit the migration of contaminants to other media | - None | - None | - None |
| S/S-3: | Containment | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils<br>- Will not satisfy Remedial Action Objectives during construction and implementation | - Potential failure of containment structure (slurry wall/cap)<br>- Will not achieve TBCs for soils<br>- Satisfies Remedial Action Objectives for soils | - None | - Slurry wall and cap contain contaminants | - None |
| S/S-4: | On-Site Incineration | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils during construction and implementation<br>- Will not satisfy Remedial Action | - Will achieve TBCs for soils *<br>- Satisfies Remedial Action Objectives for soils *<br>- Potential leaching from stabilized mass * | - Some contaminants destroyed permanently | - Contaminants destroyed or solidified | - Some contaminants permanently destroyed |

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| | | Objectives during construction and implementation<br>- Potential short-term risk to on-site workers and community from incinerator emissions* | | | | |
| S/S-5: | Off-Site Incineration | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation<br>- Potential short-term risks to communities related to off-site transport of contaminated soils | - Will achieve TBCs for soils<br>- Satisfies Remedial Action objectives for soils | - Some contaminants permanently destroyed | - Contaminants destroyed or solidified | - Some contaminants permanently destroyed |
| S/S-6: | On-Site Stabilization/ Solidification | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils<br>- Will not satisfy Remedial Action Objectives during construction and implementation | - Will not achieve TBCs for soils<br>- Potential leaching from stabilized mass * | - None | - Contaminants solidified in immobile matrix | - None |
| S/S-7: | In-Situ Vitrification | - Potential short-term risks to on-site workers and surrounding community from off-gases containing volatile compounds depending upon possible pilot studies | - Potential failure of vitrified mass<br>- Will not achieve all TBCs for soils depending on possible pilot studies<br>- Satisfies Remedial Action Objectives, depending on possible | - Some contaminants pyrolyzed in situ | - Contaminants vitrified | - Vitrification reduces soil/sludge volume |

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| | | - Will not achieve all TBCs for soils during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation | pilot studies | | | |
| S/S-8: | Off-Site Disposal | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soil during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation<br>- Potential short-term risks to communities related to off-site transport of contaminated soils | - Will achieve TBCs for soils<br>- Satisfies Remedial Action Objectives | - None | - None | - None |
| S/S-9: | In Situ Soil Flushing, Stabilization/Solidification | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils<br>- Will not satisfy Remedial Action Objectives during construction and implementation<br>- Potential migration of contaminants to other media due to flushing | - Will achieve all TBCs for soils *<br>- Satisfies remedial action objectives *<br>- Potential leaching from solidified mass * | - None | - Removes some contaminants from soil/sludge matrix, immobilizes others in solidified mass | - Transfers contaminants to a smaller volume medium |
| S/S-10: | Contaminant Extraction, Stabilization/Solidification | - Potential short-term risks to on-site | - Will not achieve all TBCs for soils * | - None | - Contaminants removed from | - Some contaminants transferred to |

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| | | workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve all TBCs for soils<br>- Will not satisfy Remedial Action Objectives during construction and implementation | - Will satisfy Remedial Action Objectives *<br>- Potential leaching from solidified mass * | | soil/sludge or immobilized in soil matrix | smaller volume media |
| S/S-11: | In Situ Vacuuming, Soil Flushing, Stabilization/ Solidification | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation<br>- Potential migration of contaminants to other media due to flushing | - Will achieve all TBCs for soils *<br>- Satisfies remedial action objectives *<br>- Potential leaching from solidified mass * | - None | - Removes some contaminants from soil/sludge matrix, immobilizes others in solidified mass | - Transfers contaminants to a smaller volume medium |
| S/S-12: | In Situ Soil Vacuuming, Soil Flushing | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation<br>- Potential migration of contaminants to other media due to | - Will achieve all TBCs for soils *<br>- Satisfies remedial action objectives * | - None | - Removes contaminants from soil/sludge | - Transfers contaminants to a smaller volume medium |

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| | flushing | | | | |
| S/S-13: In Situ Stabilization/ Solidification | - Potential short-term risks to on-site workers and community from minimal volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs during construction and implementation<br>- Will not satisfy Remedial Action Objectives during construction and implementation | - Will not achieve TBCs for soils •<br>- Will satisfy Remedial Action Objectives •<br>- Potential leaching from solidified mass • | - None | - Contaminants solidified in immobile matrix | - None |
| S/S-14: Bioreclamation, In Situ Stabilization/Solidification | - Potential short-term risks to on-site workers and community from minimal volatile and fugitive dust emissions during excavation<br>- Will not achieve TBCs for soils<br>- Will not satisfy Remedial Action Objectives • | - Will not achieve all TBCs for soils<br>- Will satisfy Remedial Action Objectives •<br>- Potential leaching from solidified mass • | - Some contaminants biodegraded | - Some contaminants biodegraded/ immobilized in solid matrix | - None |

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• Depending upon treatability study results

TABLE 3 (cont.)

| | Alternative | Short-Term Protectiveness | Long-Term Protectiveness | Reductions in Contaminant: Toxicity | Mobility | Volume |
|---|---|---|---|---|---|---|
| T-1: | In Situ Vitrification | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions, depending upon possible pilot studies<br>- Will not achieve all TBCs for sludge until remediation is complete<br>- Will not satisfy Remedial Action Objectives until remediation is complete | - Potential failure of vitrified mass<br>- Will not achieve all TBCs for soils/sludges<br>- Satisfies Remedial Action Objectives, depending on possible pilot studies | - Some contaminants pyrolyzed in situ | - Contaminants vitrified | - Vitrification reduces soil/sludge volume |
| T-2: | In Tank Stabilization, On-Site Disposal | - Potential short-term risks to on-site workers and surrounding community from off-gases and fugitive dust emissions during remediation<br>- Will not achieve TBCs for sludge until remediation is complete<br>- Will not satisfy Remedial Action Objectives until remediation is complete | - Will not achieve TBCs for soils/sludges<br>- Satisfies Remedial Action Objectives *<br>- Potential failure of on-site disposal unit and leaching of solidified mass | - None | - Contaminants solidified in immobile matrix | - None |
| T-3: | On-Site Incineration | - Potential short-term risks to on-site workers and surrounding community from off-gases and fugitive dust emissions during remediation<br>- Will not achieve TBCs for sludge until remediation is complete<br>- Will not satisfy Remedial Action | - Will achieve TBCs for soils/sludges<br>- Satisfies Remedial Action Objectives *<br>- Potential failure of on-site disposal unit and leaching of solidified mass | - Some contaminants permanently destroyed | - Contaminants destroyed or immobilized | - Some contaminants destroyed |

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| | | Objectives until remediation is complete * | | | | |
| T-4: | Off-Site Incineration | - Potential short-term risks to on-site workers and surrounding community from off-gases and fugitive dust emissions during remediation<br>- Will not achieve TBCs for sludge until remediation is complete<br>- Will not satisfy Remedial Action Objectives until remediation is complete *<br>- Potential short-term risks to communities during transportation | - Will achieve TBCs for soils/sludges *<br>- Will satisfy Remedial Action Objectives * | - Some contaminants permanently destroyed | - Contaminants destroyed | - Some contaminants destroyed |
| T-5: | Off-Site Disposal | - Potential short-term risks to on-site workers and surrounding community from volatile and fugitive dust emissions<br>- Will not achieve TBCs for sludge until remediation is complete<br>- Will not satisfy Remedial Action Objectives until remediation is complete *<br>- Potential short-term risks to communities during transportation | - Will achieve TBCs for soils/sludges<br>- Satisfies Remedial Action Objectives | - None | - None | - None |

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* Depending upon treatability study results

### 2.3.2 Implementability

The implementability evaluation is used to measure both the technical and administrative feasibility of constructing, operating, and maintaining a remedial action alternative. Technical feasibility refers to the ability to reliably operate, and meet technology-specific regulations until a remedial action is complete. It also includes operation, maintenance, replacement, and monitoring of technical components of an alternative.

Administrative feasibility refers to the ability to obtain approvals from local agencies; the availability of treatment, storage, and disposal services and capacity; the requirements for and availability of specific equipment and technical specialists, and potential coordination steps to lessen any negative aspects of the alternative. A summary of implementability criteria currently under evaluation is included as Table 4.

### 2.3.3 Cost Evaluation

Cost evaluation includes estimates of capital costs, annual operation and maintenance (O&M) costs, and present worth analyses. These conceptual cost estimates are order-of-magnitude estimates, and are being prepared based on 1) preliminary conceptual engineering for major construction components, 2) CORA cost modules for estimates of capital investment and general annual operation and maintenance costs, and 3) vendor quotes.

Present worth analyses are used to evaluate expenditures that occur over different time periods by discounting all costs to a common base year so that the costs for different remedial action alternatives can be compared on the basis of a single figure for each alternative.

## 2.4 Summary of the Remedial Action Alternative Screening Process

Only those alternatives that satisfy the effectiveness and implementability criteria will be subjected to a cost analysis. The purpose of considering costs at this time will be to eliminate those alternatives whose costs are significantly higher than others, unless significant environmental, public health, or reliability benefits are realized by this additional cost.

Table 4
Implementability Criteria Evaluation

| Alternative | | Technical Feasibility | Administrative Feasibility |
|---|---|---|---|
| GW-1: | No Action | - Semi-annual sampling/analysis required | - Action not warranted per local agencies |
| GW-2: | Limited Action | - Semi-annual sampling/analysis required | - Requires adjustment of deed |
| GW-3: | Chemical Oxidation,<br>Biological Treatment,<br>Optional GAC,<br>Optional Chemical Precipitation | - Proven technology<br>- Carbon, if needed, must be replaced/ regenerated regularly by supplier<br>- Large sludge disposal requirements (biological, chemical)<br>- Semi-annual sampling/analysis required | - Equipment available<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW waste landfill or incinerator) |
| GW-4: | Chemical Precipitation,<br>UV/Peroxidation,<br>Optional GAC | - Carbon, if needed, must be replaced/ regenerated regularly by supplier<br>- Minimal sludge disposal requirements (chemical)<br>- Semi-annual sampling/analysis required | - Relatively few full-scale installations<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW Landfill) |
| GW-5: | Chemical Precipitation, GAC,<br>Sequencing Batch Reactors | - Proven technology<br>- Carbon must be replaced/regenerated regularly by supplier<br>- Large sludge disposal requirements (biological, chemical)<br>- Semi-annual sampling/analysis required | - Equipment available<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW Landfill or incinerator) |
| GW-6: | Chemical Precipitation,<br>Steam Stripping,<br>Optional GAC or<br>UV/Peroxidation | - Proven technology<br>- Carbon, if needed, must be replaced/ regenerated regularly by supplier<br>- Minimal sludge disposal requirements, if any (chemical)<br>- By-product incineration requirements<br>- Semi-annual sampling/analysis required | - Equipment available<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW Landfill)<br>- Condensate incineration capabilities available |
| GW-7: | Optional Chemical Precipitation,<br>Critical Fluid Extraction,<br>Optional GAC or<br>UV/Peroxidation | - Proven technology<br>- Carbon, if needed, must be replaced/ regenerated regularly by supplier<br>- Minimal sludge disposal requirements, if any (chemical)<br>- By-product incineration requirements<br>- Semi-annual sampling/analysis required | - Equipment available<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW Landfill)<br>- Extractant incineration capacity available |
| GW-8: | PACT,<br>Optional UV/Peroxidation<br>Optional Chemical Precipitation | - Proven technology<br>- Larger sludge disposal requirements (biological, chemical)<br>- Semi-annual sampling/analysis required | - Equipment available<br>- Compliance with NPDES substantive requirements<br>- Dewatered sludge disposal options available (HW Landfill or incinerator) |

Table 4 (con't)

| Alternative | | Technical Feasibility | Administrative Feasibility |
|---|---|---|---|
| S/S-1: | No Action | N/A | - None |
| S/S-2: | Limited Action | N/A | - Land use restrictions |
| S/S-3: | Containment | - Proven technologies | - Land use restrictions |
| S/S-4: | On-Site Incineration | - Proven technologies<br>- Potential difficulties in controlling metallic particulates and/or fumes<br>- Requires RCRA land disposal unit for ash<br>- Potential land disposal restrictions of ash | - Difficulty in siting<br>- Local opposition<br>- Additional trial burning may be required<br>- Equipment availability limited<br>- Land use restrictions |
| S/S-5: | Off-Site Incineration | - Proven technologies<br>- Requires drumming of all wastes prior to transport<br>- Potential land disposal restrictions of ash | - Incineration capacities limited |
| S/S-6: | On-Site Stabilization/ Solidification | - Technology capabilities limited<br>- Potential land disposal restrictions | - Equipment available<br>- Land use restrictions |
| S/S-7: | In Situ Vitrification | - Technology not well demonstrated beyond pilot -scale<br>- Requires pilot study | - Equipment availability limited<br>- Land use restrictions<br>- APCD discharge |
| S/S-8: | Off-Site Disposal | - Potential land disposal restrictions | - SARA discourages land disposal |
| S/S-9: | In Situ Soil Flushing, Stabilization/Solidification | - Technology capabilities limited<br>- In situ techniques limited due to debris in fill | - Equipment available<br>- Land use restrictions |
| S/S-10: | Contaminant Extraction, Stabilization/Solidification | - Technology capabilities limited<br>- Requires RCRA land disposal unit<br>- Potential land disposal restrictions | - Equipment available<br>- Land use restrictions |
| S/S-11: | In Situ Vacuuming, Soil Flushing, Stabilization/Solidification | - Technology capabilities limited for soil flushing and stabilization/solidification<br>- In situ techniques limited due to debris in fill | - Land use restrictions<br>- APCD discharge |
| S/S-12: | In Situ Vacuuming, Soil Flushing | - Technology capabilities limited | - Equipment available<br>- APCD discharge<br>- Land use restrictions |
| S/S-13: | In Situ Stabilization/ Solidification | - Technology capabilities limited<br>- In situ techniques limited due to debris in fill | - Equipment available<br>- Land use restrictions |

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|---|---|---|
| S/S-14: Bioreclamation, In Situ Stabilization/Solidification | - Technology capabilities limited<br>- In situ techniques limited due to debris in fill | - Equipment available<br>- Land use restrictions |

Table 4 (con't)

| Alternative | | Technical Feasibility | Administrative Feasibility |
|---|---|---|---|
| T-1: | In Situ Vitrification | - Technology not well demonstrated beyond pilot -scale<br>- Requires pilot study<br>- Must be in conjunction with vitrification of all other soils/sludges (S/S-7) | - Equipment availability limited<br>- Land use restrictions<br>- APCD discharge |
| T-2: | In-Tank Stabilization/ Solidification, On-Site Disposal | - Technology capabilities limited<br>- Potential land disposal restrictions | - Equipment available<br>- Land use restrictions |
| T-3: | On-Site Incineration | - Proven technologies<br>- Potential difficulties in controlling metallic particulates and/or fumes<br>- Requires RCRA land disposal unit for ash<br>- Potential land disposal restrictions of ash<br>- May require mixing with on-site soils | - Difficulty in siting<br>- Local opposition<br>- Additional trial burning may be required<br>- Equipment availability limited<br>- Land use restrictions |
| T-4: | Off-Site Incineration | - Proven technologies<br>- Requires drumming of all wastes prior to transport<br>- Potential land disposal restrictions of ash | - Incineration capacities limited |
| T-5: | Off-Site Disposal | - Potential land disposal restrictions | - SARA discourages land disposal |

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